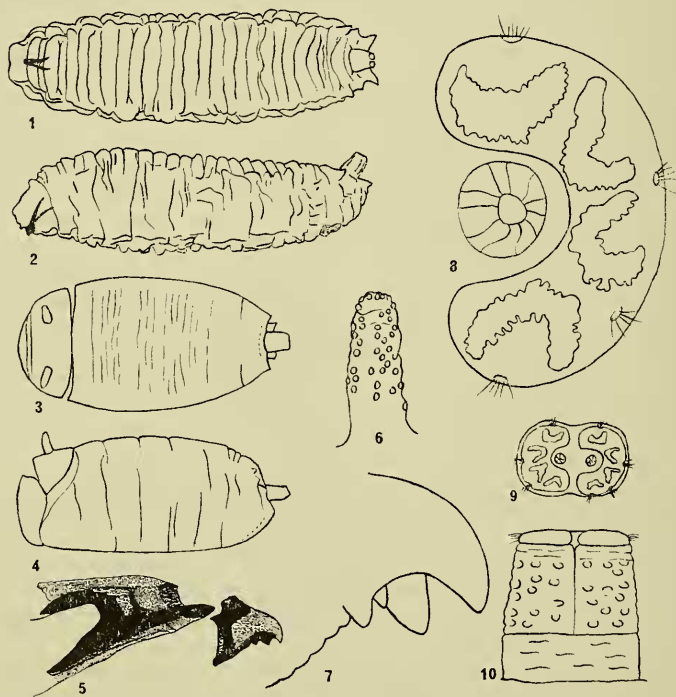


The larva and puparium of *Cheilosia bergenstammi* Becker (Diptera: Syrphidae) with a summary of the known biology of the genus in Europe

By KENNETH G. V. SMITH *

The genus *Cheilosia* contains some 130 Palaearctic species but of these the immature stages of only 9 species have been described and some biological information is available for some 21 species. Hennig (1952) includes descriptions and illustrations of 4 species: *C. cynocephala* Loew, *C. fasciata* Schiner & Egger, *C. morio* Zetterstedt and *C. scutellata* Macquart. Dusek and Laska (1962) describe and illustrate the larvae and puparia of *C. grossa* Fallen and *C. fasciata*, and Dusek (1962) describes the larvae and puparia of *C. canicularis* Panzer, *C. omissa* Becker and *C. variabilis* Panzer. In the present paper the larva and puparium of *C. bergenstammi* Becker are described.



Figs. 1-10. *Cheilosia bergenstammi* Becker: 1, larva, dorsal view; 2, larva, lateral view; 3, puparium, dorsal view; 4, puparium, lateral view; 5, larval cephalopharyngeal skeleton, lateral view; 6, puparium, anterior spiracle; 7, larval mandible, lateral view; 8, larval posterior spiracle, dorsal view; 9, puparium, spiracular disc; 10, puparium, posterior spiracular tube in spiracle.

* Department of Entomology, British Museum (Nat. Hist.), London.

Larva roughly cylindrical in shape but narrower anteriorly and broader posteriorly: 9-10 mm long, 3 mm broad and 3 mm deep; colour whitish to brownish (figs. 1, 2). Cephalopharyngeal skeleton (fig. 5) of the photophagous type (Hartley, 1963), with mandibles fused together dorsally and ventrally and toothed (fig. 7). Anterior spiracles small; posterior spiracles sessile, stem $1\frac{1}{2}$ times as long as broad at base. Spiracular disc flat, each spiracle surrounded by 4 curved slits with serrated margins (fig. 8). Three pairs of short lappets, middle pair reduced.

Puparium somewhat inflated, muddy-brown with reddish-brown spiracular processes (figs 3, 4). Anterior spiracles (fig. 6) long and tuberculate. Posterior spiracles (figs. 9, 10) a little longer than broad.

The larvae were found mining the roots and crowns of Ragwort (*Senecio jacobaea*), near Omagh, Co. Tyrone, Northern Ireland in October 1969. There was visible wilting of the plants. The larvae pupated in November and emerged in April, 1970. The larva closely resembles that of *C. omissa* Becker as illustrated by Dusek (1962) which was found on *Senecio nemorensis fuchsii*. The possible synonymy of these two species should therefore be considered when the adults of this difficult genus are revised. Both species were described by Becker in the same paper (1894). It would be of interest to investigate the possibility of biological control of ragworts by these species. The known biology of the European species of the genus is summarised below.

CHEILOSIA SPECIES	PLANT (orig. nomenclature)	SOURCE
<i>albipila</i> (as <i>chrysocoma</i>)	<i>Carduus crispus</i> (stem-root)	Weyenburgh (1869)
<i>albipila</i> (as <i>flavicornis</i>)	<i>Carduus crispus</i> , <i>Cirsium oleraceum</i> (stem)	Boie (1850)
<i>albipila</i>	<i>Cnicus palustris</i> (stems)	Andrews (1944)
<i>antiqua</i> (as <i>sparsa</i>)	<i>Primula</i> spp. (roots)	Carpenter (1913)
<i>bergenstammi</i>	<i>Senecio jacobaea</i> (roots, crowns)	present paper
<i>canicularis</i>	<i>Petasites hybridus</i> , <i>albus</i> , <i>kablikianus</i> (rhizome)	Dusek (1962)
<i>chloris</i>	<i>Petasites niveus</i> (roots)	Kaltenbach (1874)
<i>cynocephala</i>	<i>Carduus nutans</i> (stem)	Frauenfeld (1866) Dusek & Laska (1962)
<i>fasciata</i>	<i>Allium ursinum</i> (leaf-mine)	Beling (1888) Dusek & Laska (1962)
<i>grossa</i>	<i>Cnicus palustris</i> (stem)	Nurse (1910a, b)
<i>grossa</i>	<i>Carduus crispus</i> (stem)	Dusek & Laska (1962)
<i>hercyniae</i>	<i>Amanita muscaria</i>	Vimmer (1925)
<i>longula</i>	<i>Boletus luridus</i> , <i>bovinus</i>	Buxton (1955)
<i>longula</i>	<i>Suillus</i> & <i>Leccinum</i>	Hackman & Meinander (1979)
<i>maculata</i>	Associated with <i>Allium</i>	needs further investigation
<i>morio</i>	'pine' (bark wounds)	Trägårdh (1939)
<i>mutabilis</i>	<i>Carduus acanthoides</i> (root)	Rossi (1848)
<i>nitidula</i>	<i>Matricaria chamomilla</i> (stem)	Kaltenbach (1864)
<i>omissa</i>	<i>Senecio nemorensis</i> ssp. <i>fuchsii</i>	Dusek (1962)

<i>scutellata</i>	rotten fungi	Roser (1834)
<i>scutellata</i>	<i>Boletus edulis, pinetorum</i>	Dufour (1840)
<i>scutellata</i>	<i>Polyporus</i>	Frauenfeld (1868)
<i>scutellata</i>	truffles	Goureau (1852), corrected
(as ♂ nr. <i>mutabilis</i>)		Verrall (1901)
<i>scutellata</i>	<i>Boleus, Leccinum, Suillus</i>	Eisfelder (1956)
<i>scutellata</i>	<i>Boletus, Leccinum, Gyroporus,</i> <i>Xerocomus</i>	Dely-Drascovits (1972)
<i>scutellata</i>	<i>Boletus, Pholiota</i>	Chandler (1969)
<i>scutellata</i>	<i>Leccinum</i>	Hackman & Meinander (1979)
<i>soror</i>	truffles	Goureau (1852) corrected
(as ♀ nr. <i>scutellata</i>)		Verrall 1901)
<i>variabilis</i>	<i>Carduus nutans, acanthoides,</i> <i>Cirsium lanceolatum</i> (buds-stalks)	Kaltenbach (1874)
<i>variabilis</i>	<i>Scrophularia nodosa</i> (roots)	Fryer (1915)
<i>variabilis</i>	<i>Scrophularia nodosa</i> (roots)	Dusek (1962)
<i>velutina</i>	<i>Scrophularia nodosa</i> (roots)	Brischke (1880)
(as <i>gigantea</i>)		
<i>vernalis?</i>	Under decaying leaves	Dufour (1848)
(<i>aerea</i>)	of <i>Verbascum pulverulentum</i>	
<i>vernalis?</i>	<i>Matricaria chamomilla</i>	Kaltenbach (1864)
(<i>nitidula</i>)	(stem root)	
sp.	Truffles	Laboulbene (1864)
sp.	Truffles	Reaumer (1740)
sp.	Turnips	Lunbeck (1916)
sp.	Onions	present paper

In addition to the above records Zetterstedt (1843) records finding pupae of *C. variabilis* and *C. albitarsis* (as *flavimana*) but gives no habitat details. In most of the stem-feeders the larvae appear to migrate down towards the root and pupate in the soil. Lundbeck (1916) records finding the puparia of *C. scutellata*, *C. intonsa*, *C. albitarsis* and *C. vernalis* in flood refuse and a larva of an unidentified species in turnips when about 12% of the crop was destroyed, but unfortunately the larvae were not reared. I have seen a *Cheilosia* larva from frozen onions from Spain and one wonders if some of the records of *Eumerus* from similar sources may in fact be *Cheilosia*.

There appears to be some evidence, from field observations, that *Cheilosia* adults often frequent flowers of the same species of plants in which their larvae develop and this offers a fruitful line of investigation. There is no doubt that the taxonomy of this difficult genus will only be satisfactorily resolved when long series of reared specimens are available for study, coupled with a careful reappraisal of type material.

Acknowledgements

I thank Mr. D. J. Mowat, Agricultural Entomology Division, Ministry of Agriculture, Queen's University, Belfast for sending this interesting material for study and to Dr. M. C. D. Speight of the Forest and Wildlife Service, Dublin for agreeing with my identification of the adult.

References

- Andrews, H. W., 1944. *Chilosia albipila* Meigen bred. *Entomologist's Rec. J. Var.* 56: 71.

- Becker, T., 1894. Revision der Gattung *Chilosia* Meigen. *Nova Acta Acad. Caesar. Leop. Carol.* 62 (3): 194-524.
- Beling, T., 1888. Beitrag zur Metamorphose zweiflügeliger einiger Insekten aus den Familien Tabanidae, Empidae und Syrphidae. *Verh. zool. bot. Ges. Wien.* 38: 1-4.
- Boie, F., 1850. Entomologische Beiträge. *Stettin. ent. Ztg.* 1850: 212-216.
- Brauer, F., 1883. Die Zweiflügler des Kaiserlichen Museums zu Wien III. *Denkschr. Akad. Wiss. Wien* 47: 1-100.
- Brischke, C. G., 1880. [excursion]. *Ent. Nachr. Berlin*, 6: 56.
- Buxton, P. A., 1955. British Diptera associated with fungi. III. Flies of all families from about 150 species of fungi. *Entomologist's mon. Mag.* 96: 61-94.
- Carpenter, G. H., 1913. Injurious insects and other animals observed in Ireland during the year 1912. *Econ. Proc. R. Dublin. Soc.* 2 (6): 79-104.
- Chandler, P. J., 1969. The Hover-flies of Kent. *Trans. Kent Fld. Club.* 3 (3): 139-202.
- Dely-Draskovits, A., 1972. Systematische und Ökologische Untersuchungen an den in Ungarn als Schädlinge der Hutpilze auftretenden Fliegen. 1. Limoniidae, Syrphidae, Platypezidae, Chloropidae (Diptera). *Acta zool. hung.* 18: 7-21
- Dufour, L., 1840. Sur les métamorphoses des Diptères. *Annls. Sci. nat.* 13 (2): 148-163.
- Dufour, L., 1848. Histoire des métamorphoses du *Cheilosia aerea*. *Annls. Sci. nat.* 9 (3): 205-209.
- Dusek, J., 1962. Beiträge zur kenntnis von larven der Gattung *Cheilosia* Meigen (Diptera, Syrphidae). *Cas. cs. Spol. ent.* 59: 68-73.
- Dusek, J. & Láska, P., 1961. Príspevek k poznáni larev pestrenek (Syrphidae, Diptera) — III. *Prírodov. Cas. slezky.* 34: 513-542.
- Dusek, J. & Láska, P., 1962. Beitrag zur Kenntnis einiger syrhidien — larven (Diptera, Syrphidae). *Cas. cs. Spol. ent.* 59: 348-356.
- Eisfelder, I., 1956. Die häufigsten Pilzbewohner (Fliegen als Pilzverzehr). *Z. Pilzk.* 22 (4): 108-117.
- Frauenfeld, G., 1866. Zoologische Miscellen X. *Verh. zool.-bot. Ges. Wien.* 16: 961-982.
- Frauenfeld, G., 1868. Zoologische Miscellen XIV. *Verh. zool.-bot. Ges. Wien.* 18: 147-166.
- Fryer, J. C. F., 1915. The food-plant of *Chilosia variabilis* Panzer. *Entomologist's mon. Mag.* 51: 193.
- Goureau, C. C., 1852. [Observations sur le male de *Cynips rosae* et sur plusieurs Insectes vivant aux dépens de la Truffe.] *Annls. Soc. ent. Fr.* 10 (Bull.): LXXV-LXXVII.
- Hackman, W. & Meinander, M., 1979. Diptera feeding as larvae on macrofungi in Finland. *Annls zool. fenn.* 16: 50-83.
- Hardy, J. 1872. Memiors on Scottish Diptera. *Scott. Nat.* 1871-2: 177-180.
- Hartley, J. C., 1963. The Cephalopharyngeal apparatus of syrphid larvae and its relationship to other Diptera. *Proc. zool. Soc. Lond.* 141: 261-280.
- Hennig, W., 1952. *Die Larvenformen der Dipteren.* 3. Berlin.
- Kaltenbach, J. H., 1864. Die deutschen Phytophagen aus der Klasse der Insekten. *Verh. naturh. Ver. preuss. Rheinl.* 21: 228-404.
- Kaltenbach, J. H., 1874. *Die Pflanzenfeinde aus der Klasse der Insekten.* Stuttgart.
- Laboulbène, A., 1864. Observations sur les insectes tubérovores. Avec refutation de l'erreur qui, attribuent les Truffes a la piqûre d'un Insecte les afait assimiler aux galles végétales. *Annls. Soc. ent. Fr.* 4 (4): 69-114.
- Lundbeck, W., 1916. *Diptera Danica.* 5. *Lonchopteridae, Syrphidae.* Copenhagen.
- Meijere, J. C. H. de., 1947. Over eenige Dipterenlarven, waaronder een galmug, die mijngangen maakt entwee Dipteren die gallen op paddenstoelen veroorzaken. *Tijdschr. Ent.* 88: 49-62.
- Nurse, C. G., 1910a. Notes regarding the breeding of *Chilosia grossa*. *Entomologist.* 43: 313-314.

- Nurse, C. G., 1910b. Further notes regarding the breeding of *Chilosia grossa*. *Entomologist*. **43**: 313-314.
- Réaumur, R. A. F. de., 1740. *Mémoires pour servir à l'histoire des Insectes*. V. Paris.
- Roser, C. L. F. von., 1834. Verzeichnisse in Wortemberg vorkommender zweiflügliger Insekten. *KorrespBl. k. Wurrtt. Landwirt ver Stuttgart*. **1834**: 1-19.
- Rossi, F., 1848. *Systematisches verzeichniss der Zweiflügelichten Insecten (Diptera) des Erzherzogthumes Osterreich*. Wien.
- Trägårdh, J., 1939. *Sveriges Skoginsektor* 2. Auflage. Stockholm.
- Verrall, G. H., 1901. *British Flies*. 8. *Platypezidae, Pipunculidae and Syrphidae of Great Britain*. London.
- Vimmer, A., 1925. *Larvy a kukly dvojkrídlelio Stredoevropského se zvláštím zretelem na skudce rostlin kulturních*. Prague.
- Weyenberg, H., 1869. *Nederlandsche Diptera in Metamorphose en levenswijze*. *Tijds. v. Ent.* **12**: 155-174.
- Zetterstedt, J. W., 1843. *Diptera Scandinaviae* II. Lund.

Postscript

Since writing the above paper Mr. Alan Stubbs has kindly drawn my attention to two records of reared *Cheilosia semifasciata* Becker: Speight, M. C. D., Chandler, P. J. & Nash, R., 1975, *Proc. R. Irish. Acad.* **75** (B) (1): 9, record it mining *Umbilicus*; Uffen, R. & Chandler, P. J., 1978, *In Subbs, A. E. & Chandler, P. J., A Dipterist's Handbook, Amat. Ent.* **15**: 221, record it from *Sedum telephium* and *Umbilicus*.

GEGENES PUMILIO (LEP.: HESPERIIDAE): A RECORD FOR CRETE. — Belatedly, I would like to record the capture of a single specimen of this species on the island of Crete. The specimen was taken on 9.iv.1973 on rough land, close to a small patch of cultivated land at about 400 metres above sea-level, close to Neapolis in the east of the island. This area is about 20 kilometres north of the Plateau of Lasithi, and 10 kilometres from the north coast of the island. Whilst this is not the first record of this butterfly occurring in Crete (L. G. Higgins *pers. comm.*), the fact remains unrecorded in Higgins and Riley, *A Field Guide to the Butterflies of Britain and Europe*, third Edition (1975). — DAVID C. HOCKIN, Culterty Field Station, University of Aberdeen, Newburgh, Ellon, Aberdeenshire.

KYBOASCA BIPUNCTATA (OSHANIN) (HOMOPTERA: AUCHENORHYNCHA: TYPHLOCYBINAЕ): A SPECIES NEW TO BRITAIN. — 40 ♂ 40 ♀ specimens of *Kyboasca bipunctata* (Oshanin) were identified in a large sample of leafhoppers collected from English Elm (*Ulmus procera*) at Mitcham, Surrey on 2nd July 1978. Although previously unrecorded in Britain, *K. bipunctata* is widely recorded in the Palaearctic on Elms. A further male specimen was taken on English Elm at Twitton nr. Otford, Kent, July 1978, by Mr. W. R. Dolling. My thanks to Dr. J. Dlabola (Narodni Museum, Czechoslovakia) for confirming the identification. It will be dealt with by Dr. W. J. de Le Quesne in his forthcoming Royal Entomological Society handbook on the Typhlocybinae. — M. R. WILSON, Department of Zoology, University College, Cardiff.